



DEVELOPING A REGIONAL INNOVATION-LED BIOECONOMY STRATEGY FOR EASTERN AFRICA (BiSEA)

Proceedings of the Bioeconomy Futures for Eastern Africa Workshop
Held from 30 September – 1 October 2019 at the Silver Springs Hotel, Nairobi, Kenya

Submitted by:

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REPORT ON DAY 1 – SEPTEMBER 30, 2019

INTRODUCTION

This Futures Workshop was conducted under the premise of the “Developing and innovation-led Bioeconomy strategy for eastern Africa (BiSEA)”, the objective being to enable participants to start reassessing their original assumptions on Bioeconomy Futures of the region, and ask new questions about their current situation and thus craft better futures. Offering a ‘best guess’ or defining a single ‘preferred future’ is not the purpose of this workshop.

It was based on the premise that the emergence of a strong Bioeconomy that can drive economic transformation depends on anticipating the future and developing needed strategies and policies to address the opportunities presented. The anticipation depends very much on the trends we see and assumptions (implicit and explicit) we make about them and thus the impact. The futures we see are as good as the assumptions we make. There is therefore need for revealing the assumptions and questioning them. Hopefully we can then revise them with better grounded assumptions and thus identify better policy levers to shape the futures we want.

Through this workshop, in collaboration with the national working groups (NWGs), the ATPS sought to apply foresight studies and scenarios building in STI and Bioeconomy development to: Perform scenario exercises at a regional basis on future potential, opportunities for bio-based economic growth and industrial development in the region and through this benchmark existing capacities against future requirements to guide Bioeconomy development strategies in the region.

This is an important pillar of the regional bio-economy strategy. It is premised on the fact that foresighting and scenario building methodologies are increasingly recognised worldwide as a powerful instrument for establishing common views on future development strategies among policy-making bodies. STI foresight studies particularly provide inputs for the formulation of STI policies and strategies that guide the prioritisation of investments (including R&I investments).

The exercise focused on a number of factors for Bioeconomy growth and industrial development considered to be the enablers of Bioeconomy development in eastern Africa including: 1. Establishment of national Bioeconomy strategies, policy agendas and action plans/roadmaps 2. Creation of market demand, implementation of enabling policies and regulatory frameworks that create demand, 3. Creating infrastructure and market for bio-based growth and industrial development 4. Financing innovation and new bio-businesses, 5. Capacity development (infrastructure and human capital), 6. Building business, incubating and linking actors for commercialising/scaling up bio-based value chains and processing opportunities. Using scenario building, these factors will be assessed and their associated **trends, events and key opportunities/priority areas for Bioeconomy development in the region identified.**

The interrogation was done hand in hand with BiSEA Stakeholders including the National Working Groups, representatives from government (policy makers), R&D Organisations, Academic Institutions, Private Sector actors, National Science Councils/Commissions, Bio/pharmaceutical actors and Biomass/biomaterial producers.

Welcome remarks were made by the African Technology Policy Studies Networks (ATPS) Executive Director, Dr Nicholas Ozor, remarking that by the end of the workshop, everyone would leave with better perception and understanding of Bioeconomy. As no single country in Africa has a functional Bioeconomy policy, and therefore, from the rich endowment of biological resources in Africa, every country would like to harness from the available resources for development. Dr Julius Ecuru in his opening remarks also stated that Eastern Africa is the fastest growing in Africa,



and hence the need for a sustainable Bioeconomy strategy, since majority of the countries depends on biological resources.



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TEAMBUILDING ACTIVITY: NAME GAME + POLAK GAME

A teambuilding polak activity was performed involving all workshop participants. Everyone expressed themselves freely on their expectations from the workshop and what they hate/dislike about policy makers, scientists and entrepreneurs.

Some of the expectations from the workshop included:

- i. Noble ideas to help in transformation of Bioeconomy in Eastern Africa
- ii. Come up with a Bioeconomy future strategy we can depend on
- iii. People to think outside the box, beyond what we are currently doing
- iv. To learn from each other and establish networks
- v. To share what we know about Bioeconomy future and resources
- vi. To learn from expertise in the workshop, that is, people who can put Bioeconomy in the right place by using available resources to develop the right strategy
- vii. To understand how the Bioeconomy future strategy will help African countries to utilise available resources
- viii. To get a common view of what is Bioeconomy and to learn more about it
- ix. To build Bioeconomy capacity and use that knowledge to contribute to national Bioeconomy policy



- x. To come up with ideas that will develop a Bioeconomy future strategy to help our countries in value addition
- xi. Have a mental diversity of Bioeconomy
- xii. Challenge our assumptions on Bioeconomy
- xiii. Contribute to national development through proper utilization of natural resources
- xiv. Have a dialogue that enables us to develop a well-coordinated strategy
- xv. To learn from the dislike (about policy makers, scientists and entrepreneurs) and develop a strategy that is inclusive and implementable
- xvi. Consensus definition of Bioeconomy in African context

Some of the expressed concerns on Bioeconomy system actors included:

- i. Policies that remain on paper with no implementation
- ii. How policy makers, scientists and entrepreneurs are unable to communicate meaningfully with each other
- iii. Their inability to see the embedded factors that hinder the realization of the policies
- iv. Formulation of policies that are donor/fund driven rather than needs driven
- v. Lack of trust between policy makers, scientists and entrepreneurs
- vi. Communication gaps among them, since every level has knowledge on how to improve people's livelihoods
- vii. Lack of synergy between them
- viii. In some countries (like Uganda), entrepreneurs do not have a clear corporate social fund for development of science and technology
- ix. Scientists like papers, if you don't have, you are nothing to them
- x. Policy makers move on very fast without ensuring implementation of the formulated policies
- xi. Poor upscaling of research findings
- xii. Entrepreneurs are not eco-friendly
- xiii. Inability of scientists to translate their papers into money
- xiv. Lack of capacity building in policy implementation
- xv. Policy makers and scientists do not simplify their jargon
- xvi. Some scientists like to have scientific information in black and white but do not like the complexity of science
- xvii. Policy makers sign conventions and declarations without commitment, thus raising false hope for scientists. As a result, scientists take home very little in their pockets

Then, all participants were regrouped depending on their perceptions about the future. Some people were optimistic that the future will be better than today, citing factors like availability of resources, increasing consciousness of people and increase in innovations as their key support factors. The second set were slightly indifferent on their future perceptions citing factors like unpredictable African leadership regimes, inability to predict technological advancements and inability to predict climate change patterns as the support factors of their perception. The third set of people were on the extremists' side with high hopes for a better future, basing their arguments on the grounds that bio-innovations should make a change and solve some existing challenges. They also cited increased population growth, changes in social lives and increased demand for food as key contributory factors.

This exercise allowed participants to be grouped in four main groups, allowing for a mix in the perceptions and attitudes on the Bioeconomy in the four groups.



PHASE 1 – TACIT TO EXPLICIT: PROBABLE FUTURES

A question was posed on the probable headline of the future papers or Twitter. A minute of silence was allowed for the delegates to think of the probable future paper headlines with a 20 year projection, examples being: "16-year-old president" "103-year-old dictator". Some of the responses that came out include:

1. "Kenya adopts 100% renewable energy"
Biogas, solar, geothermal, hydro, wind

Actors: government (policy frameworks, ministry on renewable, resource allocation sector) development partners (pro-renewable-UNEP) private sector (fabricating appliances to renewable)

System: functioning free market, education aspect embedded in the curriculum, regulatory framework, infrastructure enhancement

Myths: only need to work on 30%, specific foods cooked with some type of fuel e.g. Chapatti and charcoal, the initial cost of adopting is high, there could be cheaper

3. "Local food giant start producing all nutrient-rich tablet from bacteria"
Solving food insecurity and health supplements

Actors: Government (policy frameworks, ministry on renewable, resource allocation sector) Development partners (pro-renewable- UNEP) Private sector (fabricating appliances to renewable)

System: Functioning free market, Education aspect embedded in the curriculum, regulatory framework, infrastructure enhancement

Myths: Only need to work on 30%, specific foods cooked with some type of fuel e.g. chapatti and charcoal, the initial cost of adopting is high, there could be cheaper source e.g. nuclear

2. "Zero case of malaria by 2040 in all Eastern Africa"

Develop vaccines and medicine by the application of bio-economy knowledge

Actors: African government putting effort on vaccine and also adopt traditional medicine, farmers (planting right species), pharmaceuticals (bio), researchers (validation of drugs, custodian of gene banks, engineering mosquitoes), Community (environmental management of malaria breeding areas), education (whole curricula)

Systems: Education(curriculum), Supply chain improved to ease access, empower indigenous farmers, change of behaviour (mind-set), harmonization and validation of traditional medicine to ensure safety, improved infrastructure, research, and development.

Myths: influence of profit-making pharmaceuticals, lack of capabilities (the current level is at 70%), can't work if the farmers are left behind, change the consumers' perception, and



4. "First global bioplastic billionaire from Eastern Africa joins Forbes 400 list"

Actors: policy makers (plastic bags ban, bioplastic policy formulation/industry support, tax incentives, restricted procurement), consumers (increased demand for bioplastics), researchers (breakthrough in efficient, low cost bioplastic production process, production of plastic biodegradation micro-organisms), farmers (contract farming honoured by all players).

Systems: Agricultural production supply chains working efficiently, political stability, functioning incubation system linking researchers and entrepreneurs, strong financial ecosystem, policy coherence and consistency (long term commitment).

Myths: Belief that plastics in food leads to increased cancer and plastics choking rivers and killing livestock (therefore people going for bioplastics).

6. "Environmental degradation due to misuse of natural resources"

Actors: Government (low enforcement of policies), Industries

Systems: Policy implementation, private sector, non-compliant to international regulations and framework

Myths: "Renewability" is questionable, nature takes care of itself, replanting of trees and documentation not considered, the tragedy of commons.

"Farms in North Eastern regions producing more farm produce"

5. "Loliondo grandson murdered, big pharmaceutical chief suspect"

Actors: Government (conducive policies for herbal medicine), Consumers (increased demand for herbal medicine, cultural beliefs), Entrepreneurs (branding and franchising/upscaling), Researchers (efficacy tests validating herbal medicine).

Systems: Supportive systems (agricultural raw materials), intellectual property rights (on traditional knowledge systems), conflict resolution mechanism to ensure food and medicine production balance, value addition and production systems in place.

Myths: Side effects of herbal medicine compared to conventional medicines, belief that conventional medicine is not made to cure but to manage, while herbal medicine cures

7. "Kenya and Tanzania breed and protect climate-smart red Maasai sheep for improved production" because red Maasai sheep are more resistant and produce more in harsh environments

Actors: researchers, government (KEPHIS, TALIRI), communities

Systems: animal breeders, rights regime, community access and benefit sharing system, free market

Myths: persistent climate change, animal research ethics



Key Observations from the Group Exercises

Some of the key observations from the group exercises were: at the beginning, there was a bit of difficulty to fit in the ideas; the terms probable and preferred were first discussed on to have a clear understanding, however, participants remained active and interactive capturing ideas generated. Group members were told to think beyond Eastern Africa, but globally to have a well-designed and structured Bioeconomy policy. The main focus was to bring a solution to the humanitarian crisis touching on health, farming and development in general. It was noted that the solutions generated were aimed towards the impact on the community

PHASE 1 – TACIT TO EXPLICIT: PREFERABLE FUTURES

Getting closer to more realistic grounds, groups were asked to come up with their set of preferable futures, giving the below as preferred headline statements in 2040:

- “Eastern Africa which is a global centre of bio-technology and indigenous knowledge”
- “Cockroach farming creating employment to African youths” use of cockroaches for improving nutrition (source of protein)
- “No more bio-waste in landfills, by having Waste companies in EA deliver fertilizers and bioenergy to EA”
 - “All petrol stations selling biofuels”
 - “EA cleanest cities in terms of air quality”
 - “Biodiversity hotspots”
 - “Indigenous monoculture forests”
 - “Factories using enzymes rather than using chemicals”
 - “International herbal tourism”
 - “New Biogas Frontier of livestock wastes”
 - “African bio-products on the EU market”

Key actors: Government, Policy makers/Regulators, Private sectors, Farmers, Consumers, Scientific community, Industry

Systems: Research systems, Economic systems, Supportive systems, Conflict resolution mechanisms, Production systems

Myths: Systems of regulatory/standardization well-functioning

Some negative futures were also predicted; including:

1. Motorcyclists (bode boda) protesting due to increased prices/taxation of bio-fuels
2. consumption of bio-insects is contributing to low women fertility/men impotence
3. Small businesses producing bio-products closed down due to high competition



PHASE 1 – TACIT TO EXPLICIT: GROUPS REPORT BACK

It was concluded that the probable and preferred futures may be completely different. Factors thought to be crucial in driving the Bioeconomy in future included: value chain, capacity building, systems in place (strong Financing ecosystems, procurement systems, Political systems, support systems (inputs, storage facilities, incubation systems linking researcher and private sectors, the raw agricultural material supplying systems), and working efficiently

PHASE 1 – PRE-WORK TO REFRAMING

Participants were asked to work on anticipatory assumptions behind five strong Bioeconomy enablers. The following was presented:

BIOECONOMY ENABLER	ANTICIPATORY ASSUMPTION
Human capital	<ul style="list-style-type: none"> • A Functioning Bioeconomy • Reforming education curricula • Hands on skills • Bio based products supported by key stakeholders including Universities, Trainings in school based on production of bio based products • Common understanding of the Bioeconomy • Infrastructures for teaching Bioeconomy available, Embrace the career in Bioeconomy, Qualified human resources
Infrastructure	<ul style="list-style-type: none"> • Lack of knowledge • Poor market of bio-based machinery • Feasibility studies to assess the needs • No investment in infrastructure development and maintenance
Business development	<ul style="list-style-type: none"> • All involved actors fulfilling their required roles, Starting capital available, access to loans • Conducive policies implementers • Products viable and marketable • Effective incubation services available • Human capacity for entrepreneurship exist
Financing Innovation	<ul style="list-style-type: none"> • Poor funding management • Lack of enabling politics • Lack of government allocation for research and development • Lack of stimulating public private partnerships
Market demand	<ul style="list-style-type: none"> • Population pressure • High preferences for bio-based products • User/consumer trust in bio products • A quality framework that captures on bio products • High market demand • High population pressure and hence alternative products • Consumer-focused on bio-based products



PHASE 2 – REFRAMING: PRESENTATION OF SCULPTURES

The reframing of the Bioeconomy through sculptures was an animated yet challenging task of the day, arguably the most enjoyable. Participants were advised to focus on the bio-economy as a learning economy. Someone asked why make the sculpture and the conclusion was that it was to represent "a strong bio-economy in a sculpture". Participants were given flipcharts, clipboard, play dough, scissors, glue sticks, tape, newspapers, and magazines.

1ST IDEA – GINETTE'S ECOSYSTEM LIFE



Representation of Ginette's world

A member of the group suggested ecotourism which would give employment opportunities to the locals. A factory that uses biogas from animal produce would be established through community efforts. The factory would produce insect repellents and cosmetics, among other bio-based products. Planted trees would cater for soil conservation, climate change mitigation and medicinal needs of the community. Rearing of cows and other farm animals would be done for food security and biogas production. Because of the stability, there is more

revenue generation and reaches the international level and draws the attention of the international trade partners. These influences would modernize the facilities, gaining more knowledge from the international exposure to improve life at the local level including empowerment of minority groups. Improved housing (good green apartments), good packaging of milk, a growth economy would then ensue. There would be improved infrastructure, and an international university for bio-economy would be established with a regional campus built.

REPORT ON DAY 2 – OCTOBER 1, 2019

PHASE 3 – ASKING NEW QUESTIONS

Having explored most of the thematic issues on the first day, the second day of the workshop looked into the lessons learnt in the Futures Literacy Laboratories (FLL) process and how participants thought processes in imagining the Bioeconomy futures for the eastern African region went. What were the main inhibitors, are they intrinsic or extrinsic to their work environments? How would such inhibitions affect the future formulations of the Bioeconomy Strategy?



The conclusion from the exercise was that it was not easy to conceptualise. Being a challenging activity, delegates were asked what they learnt from the exercise and they reported as follows:

- a) The most difficult task was to develop an idea and incorporate every stakeholder in the idea;
- b) It took a lot of time to comprehend what some exercise requirements were and
- c) From the presentations, it was easy to note that most groups didn't understand the whole idea of bio-economy learning;
- d) Time allocated was rather short for the whole exercise;
- e) The community should always be involved in the policies framework; and,
- f) It was also a challenge to present a viable and practical idea

Participants were then asked to disclose what some of the inhibitors to the conceptualisation and imagination exercise were. These were expressed to include:

- a) Policy issues may limit some viable ideas;
- b) The community may not perceive the whole idea which may lead to sabotage;
- c) The community may be slow to adopt new ideas and technology;
- d) Political instability is also a factor especially for foreign investors; and,
- e) The market may have an alternative (a market survey may not give the reality, some innovations may not be accepted by the market)

A debate emerged on why development policies always focus on the youth and women and not men and some comments were as follows;

- a) Women are more committed members of the society and their influence is palpable;
- b) The youth focus so that they grow with it into the future;
- c) Men have previously been owners and women have been consumers, hence the focus on men;
- d) It was suggested that the strategy should also include men in the development agenda.





Participants in session, listening in to group 1 presentation of sculpture assignment

Having made these observations, it was recommended that the strategy in development must have a priority since not all activities can be done at once. This can be achieved by developing ideas around a viable idea to ensure it matures. In addition, infrastructure is key in ensuring strategies put into place move.

KEY CONCLUSIONS ARISING FROM THE FUTURES WORKSHOP

The FLL exercise brought out the different perceptions of a learning society, challenging their assumptions on what an innovation-led regional Bioeconomy would look like. The idea was to go beyond imaginations and develop scenarios on where the region should be instead of where we are. On the strategy development, some participants thought that a top-down approach would be ideal while others felt that the countries should develop their individual strategies and these would then be consolidated at a regional level to develop this strategy.

This workshop having been held in view of contributing to the regional strategy development process, the focus of the conclusions drawn from the dynamic exercise would naturally be on the enablers interrogated. The enablers identified were group under four categories: Market Demand; Business Development; Infrastructure; Human Capital; Financing. While this was a methodological exercise rather than a policy recommendation-driven exercise, it was proposed in the debriefing session that the approach be modified to allow for the challenging of assumptions driven from policy recommendations brought forward, working towards preferred futures.

Therefore, some of the key conclusions and recommendations from the workshop are:

a) Market Demand is a key pre-requisite for a strong regional Bioeconomy

A market must exist for there to be a bio-based industry this requires the following:

- There is need for a high preference for bio-based products. The calls for promotion of local bio-based products and also ensuring the availability of the products
- Consumers must have trust in the product. This will require a common understanding of the bio-economy including the standardization of bio-based products and quality assurance framework to give consumers the needed confidence i.e. a commercialization and functional regulatory system



- Favourable procurement policies by governments e.g. green procurement, etc.

b) Fulfilling a market hinges on business development.

While conducive policies are key to attract needed investment, much more is needed. The following are also key action needed:

- Feasibility studies to understand the needs
- Intellectual property frameworks that allows EA countries to leverage their indigenous knowledge and at the same time being able to tap to knowledge from modern science
- A strong bio-economy ecosystem with all actors (government, researchers, private sector, civil society) fulfilling their required roles so that this leads to the development of products that are viable and marketable,
- Entrepreneurship capacity well developed and Effective incubation services and infrastructure us available
- Production capacity for bio-products is well developed and necessary support systems including supply chains for raw materials
- A strong triple helix network that bring universities, government and private sector together in collaborative arrangement. This will help building trust and shared vision
- Ethical issues surrounding Bioeconomy are resolved and communicated
- Political goodwill and also implementation and enforcement of relevant policies

c) A financing ecosystem that can fund all stages of development of products and viable business is key.

Such a financing ecosystem would require:

- Public funds especially for research and development and also start-ups. This can be supported by ring-fenced funding for bio-economy
- Venture capital (especially for scaling viable start-ups),
- Incentives and subsidies (to jump start investment in production)
- Standard financing for on-going business.
- Building public-private partnerships to mobilize resources and share risk

d) Developing requisite skills to generate bio-based products and services is key.

The basic foundation is education and especially in bio-sciences. However, beyond the sciences, entrepreneurship skills and also hands-on production skills are also crucial. Having needed skills will require:

- Building know-how of bio-based products is supported by key stakeholders especially Universities and also training in schools on production of bio-based products especially the hands-on skills.
- Bio-based curricula is developed at all levels of education and should include other technologies like robotics. This will require significant reform of the education curricula and putting in place the infrastructures for teaching Bio-economy including Bioscience and bioinformatics labs.
- Entrepreneurship capacity is developed.
- Students have enthusiasm bio-economy and embrace the career in Bio-economy. For this to happen, bio-based business need to be seen as profitable enough to justify early learning curricula.



APPENDICES

APPENDIX 1: PROGRAMME AND AGENDA

**DEVELOPING A REGIONAL INNOVATION-LED BIOECONOMY STRATEGY FOR EASTERN AFRICA (BiSEA)
BIOECONOMY FUTURES FOR EASTERN AFRICA WORKSHOP
HELD ON THE 30TH SEP TO 1ST OCT 2019 2019 AT THE SILVER SPRINGS HOTEL, NAIROBI**

AGENDA

DAY 1 – SEPTEMBER 30, 2019 – SWALLOW ROOM (BASEMENT)

- 8:30 Introduction
- 9:00 Teambuilding activity: Name game + Polak game
- 9:30 Phase 1 – Tacit to Explicit, part 1: probable
- 10:30 *Tea break*
- 11:00 Phase 1 – Tacit to Explicit, part 2: preferable
- 12:00 Phase 1 – Tacit to Explicit, part 3: Groups report back
- 12:30 Phase 1bis – Pre-work to reframing
- 13:15 *Lunch*
- 14:15 Phase 1bis – Plenary
- 14:30 Phase 2 – Reframing
- 16:00 *Tea break*
- 16:45 Phase 2 – Reframing, part 2: Presentation of Sculptures
- 17:15 Linking Phases
- 17:30 Close
- 18:30 *Dinner*

DAY 2 – OCTOBER 1, 2019 – SWALLOW ROOM (BASEMENT)

- 9:30 Coming Together: Throwback to a Reframed Tomorrow
- 9:45 Phase 3 – Asking New Questions, part 1
- 11:00 Phase 3 – Asking New Questions, part 2 Plenary
- 11:45 *Tea break*
- 12:15 Phase 4 – Next steps, part 1: break-out groups
- 13:10 *Lunch*
- 14:15 Phase 4 – Next steps, part 2: Plenary



- 14:40 Futures Literacy as a Comprehensive Approach to Putting the Future to Use in a Ministerial Context more Effectively and Efficiently, and Discussion
- 15:00 Closing remarks



APPENDIX 2: WORKSHOP BRIEF



Bioeconomy Futures Workshop

September 30th to 1st October, 2019

Briefing Note

INTRODUCTION

The emergence of a strong Bioeconomy that can drive economic transformation depends on anticipating the future and developing needed strategies and policies to address the opportunities presented. The anticipation depends very much on the trends we see and assumptions (implicit and explicit) we make about them and thus the impact. The futures we see are as good as the assumptions we make. There is therefore need for revealing the assumptions and questioning them. Hopefully we can then revise them with better grounded assumptions and thus identify better policy levers to shape the futures we want.

The objective of this workshop is to enable participants to start reassessing their original assumptions and ask new questions about their current situation and thus craft better futures. Offering a 'best guess' or defining a single 'preferred future' is not the purpose of this workshop.

The workshops sought to generate knowledge through 'action research' methods. Participants are invited, step by step, to make explicit their assumptions about the future (their 'anticipatory assumptions') and to become aware that there are different ways of using the future to understand how alternative assumptions about the future help to define different aspects of the present. The workshop process enables researchers to record the participant's anticipatory assumptions and how different ideas about the future alter perceptions of the present.

WORKSHOP PROCESS

The workshop has three sessions that are describe below.

Session 1: OVERVIEW - getting people to 'think futures'

The session seeks to put the participants into a frame of mind which is happy to explore past/ present/ future; what they think/ predict will happen, and what they would like (their values) to happen. Gives participants a chance to say how they think it is and will be. They'll be drawing on their professional knowledge and



experience. Specifically, it will seek to get perspectives from different group members (many have different backgrounds and perspectives) on:

- What are the main attributes of a strong Bioeconomy in next 10-15 years?
- In what ways is it different from that of today?
- What's likely to happen to the Bioeconomy sector during this time given the way things are going in health sector/ wider economy?
- Relative roles of public/ private/ voluntary/ informal sectors
- What would they like to see happen – their positive hopes
- What are their assumptions and values (eg equity/ efficiency/ safety, etc)? If they give broad values like that, then ask more specifically how they would define each of them (eg 'equity' based on access (age/ immigrants/ poverty) and what are the barriers to achieving that equity).

At the end of this first group session the rapporteurs should be able to present a rough list of anticipatory assumptions regarding expectations and values for each group.

Session 1: PLENARY

The groups report on their discussions. The facilitator will then need to:

- List themes and highlight any that are common/ different across groups.
- Draw out key values and definitions.
- Clarify your/ their understanding.
- What is within the control of the organisation(s) represented at the workshop and what is outside their control?

Session 2:

Session 2 will seek to help participants think beyond simple extrapolation, become aware of alternative systems and to be able to describe a snapshot of a Bioeconomy in a very different future. One major step in doing this is to take them, a long way forward into the future, beyond existing easy to imagine time frames say 2050 defined a 'Learning Intensive Society' (LIS)¹. A society that is no longer about mass-production and mass-consumption. It is this greater capacity to make decisions that works in functional harmony with the shift to unique creation. Thinking about an economy that is not dominated in organizational terms by the division of supply and demand allows our imaginations to escape from descriptions of the future that are limited to different ways of organizing supply and demand. Thus we can begin to describe an economy that is not necessarily dominated by firms, jobs, management. The 3D printer is a way of illustrating the idea of desktop factories where people create their unique products. Examples of things produced using 3-D printing techniques – now even available at the domestic level to custom-produce toys. Point is – what might this mean for the toy factories in China and the shipping trade that exports goods from factories to consumers... In a unique creation economy where people produce locally there would be entirely new patterns of trade. The

¹ They will be asked to wake up in this different world – the Learning Intensive Society – without worrying about how you got there, is it likely or desirable.



global sharing of ideas would become even more central but locally grown and local resources, largely from recycling and recovery, could be the source of raw material inputs

This is in order to equip them with the ability to 'let go' of simple (Session 1-type) visions of the future based on simple extrapolation. Learning Intensive Society (LIS) is meant to give them some words to describe the future in a different way – it is to help them to begin to construct new anticipatory assumptions that entertain changes in the conditions of change. The LIS is not presented as being probable or likely, nor desirable or preferable.

Session 3: Reframing

The session seeks to connect session 2 discussion and description of 2050 to our current situation. The participants will then begin to identify the way in which their anticipatory assumptions – the image of the future that they use – can change what they see and do in the present.

The trick is trying to spot what may be emergent trends right now – even before they've happened! What is it that participants are doing today in their systems that might be a new emergent trend and how might they go about spotting it? One way to help kick start this discussion, is to get them to discuss Bioeconomy systems without agriculture (say assume all nutrients could be chemically synthesized and 3D printed at home. If the future is radically different in organizational and even outcome terms, does it change how they think about some of the things that are happening today. If they see some changes in the present in a different, more emergent, more systemic way, does that provoke or inspire ideas about changes in what they do now or assumptions they make about the future?



APPENDIX 3: LIST OF PARTICIPANTS

DELEGATION	S/N	TITLE	NAME	SURNAME	GENDER	ORGANISATION	PERSONAL_EMAIL
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